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国際事務局
特許協力条約に基づいて公開された国際出願

D5
(Eng List
Version
D5*)

(51) 国際特許分類6 H04J 13/00	A1	(11) 国際公開番号 WO98/47253
		(43) 国際公開日 <i>Pub. Date</i> 1998年10月22日 (22.10.98)

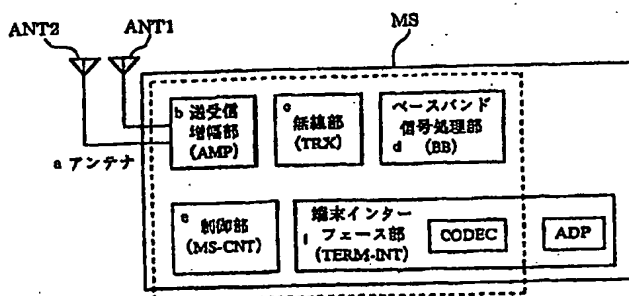
(21) 国際出願番号 PCT/JP98/01717	(22) 国際出願日 <i>Filing Date</i> 1998年4月15日 (15.04.98)	(30) 優先権データ 特願平9/114356 1997年4月16日 (16.04.97)	(71) 出願人 (米国を除くすべての指定国について) エヌ・ティ・ティ移動通信網株式会社 (NTT MOBILE COMMUNICATIONS NETWORK INC.) [JP/JP] 〒105-8436 東京都港区虎ノ門二丁目10番1号 Tokyo, (JP)	(72) 発明者：および (75) 発明者／出願人 (米国についてのみ) 東 明洋(HIGASHI, Akihiro) [JP/JP] 〒238-0315 神奈川県横浜須賀野市林2-1-3 5-306 Kanagawa, (JP) 永田清人(NAGATA, Kiyohito) [JP/JP] 〒235-0036 神奈川県横浜市磯子区中原4-20-3 Kanagawa, (JP) 柚木一文(YUNOKI, Kazufumi) [JP/JP] 〒239-0841 神奈川県横浜須賀野市野比4-18-4 A-304 Kanagawa, (JP) 高木広文(TAKAGI, Hirofumi) [JP/JP] 〒235-0033 神奈川県横浜市磯子区杉田9-2-11 B-105 Kanagawa, (JP) 小川真資(OGAWA, Shinsuke) [JP/JP] 〒221-0862 神奈川県横浜市神奈川区三枚町164-13 ライオンズマンション新横浜B-109 Kanagawa, (JP) 大野公士(OHNO, Koji) [JP/JP] 〒235-0033 神奈川県横浜市磯子区杉田9-2-8-502 Kanagawa, (JP)	(43) 国際公開日 <i>Pub. Date</i> 1998年10月22日 (22.10.98)
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DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

添付公開書類
国際調査報告書

(54) Title: CDMA COMMUNICATION METHOD

(54) 発明の名称 CDMA通信方法



a... ANTENNA
b... TRANSMISSION-RECEPTION AMPLIFYING SECTION (AMP)
c... RADIO COMMUNICATION SECTION (TRX)
d... BASE-BAND SIGNAL PROCESSING SECTION (BB)
e... MOBILE STATION CONTROL SECTION (MS-CNT)
f... TERMINAL INTERFACE SECTION (TERM-INT)

(57) Abstract

Mobile station radio communication equipment MS is provided with a transmission-reception amplifying section AMP, a radio communication section TRX, a base-band signal processing section BB, a mobile station control section MS-CNT, and a terminal interface section TERM-INT. In multi-code transmission, the availability of a frequency resource and communication quality are improved by transmitting control information (pilot symbol and TPC symbol) only with one designated individual physical channel boosted in electric power. In addition, the availability of the frequency resource and communication quality are improved and, at the same time, the power consumption is reduced by deciding the transmission/cancellation of transmission information in accordance with the communication quality and communication state. Moreover, the availability of the frequency resource is improved and the power consumption is reduced by avoiding the occurrence of frequent calls.

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 977 393 A1

(12)

EUROPEAN PATENT APPLICATION

published in accordance with Art. 158(3) EPC

(43) Date of publication:

02.02.2000 Bulletin 2000/05

(51) Int. Cl.7: H04J 13/00

(21) Application number: 98914026.4

(86) International application number:

PCT/JP98/01717

(22) Date of filing: 15.04.1998

(87) International publication number:

WO 98/47253 (22.10.1998 Gazette 1998/42)

(84) Designated Contracting States:

DE FR GB IT SE

(30) Priority: 16.04.1997 JP 11435697

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Patent- und Rechtsanwälte

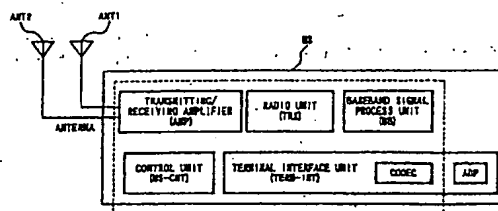
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(54) CDMA COMMUNICATION METHOD

(57) A mobile station MS regarding this invention consists of a transmission and receiving amplifier unit AMP, a radio unit TRX, a baseband signal processing unit BB, a control unit MS-CNT and a terminal interface unit TERM-INT. In the multi-code-transmission, the efficiency in use of the frequency resources is enhanced and the improvement of the communication quality is realized by transmitting the control information (a pilot symbol and a TPC symbol), with increasing the transmission power by one designated dedicated physical channel only. It is possible to improve the efficiency in use of the frequency resources and the communication quality, and to reduce the power consumption, by determining the transmission/discard of the transmission information according to the communication quality or the communication status. Furthermore, it is possible to improve the efficiency in use of the frequency resources and to reduce the power consumption, by avoiding that the calling occurs frequently.

FIG. 2



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Description

TECHNICAL FIELD

[0001] The present invention relates to a wide band CDMA (Code Division Multiple Access) communication method.

BACKGROUND ART

[0002] The use of mobile telephones has become wide spread in recent years. Conventionally, TDMA (Time Division Multiple Access) and FDMA (Frequency Division Multiple Access) have been employed as mobile telephone access methods. These days, however, CDMA is being adopted instead of TDMA and FDMA because of its various merits, such as highly efficient use of frequency bands, easy ability to change the transmission speed, and security from eavesdropping. It is also possible in CDMA to reduce the impact from fading by employing redundancy, and to carry out error correction coding. Further, communication quality is improved by a handover which does not involve frequency switching.

[0003] However, CDMA according to the prior art has a technical limitation in that its transmission speed is low since it is prepared mainly for voice transmission. Thus, due to the low transmission speed, CDMA is not suitable for data communication. With the development of multimedia in recent years, high-speed transmission has been desired because data to be transmitted includes not only voice data, but also various types of data that can be processed in a computer. Specifically, an extremely high transmission speed is required when image data is transmitted.

[0004] In mobile communications applying conventional CDMA, problems are encountered such as a narrow spreading band width, and a limited ability to reduce the effect of fading. Moreover, mobile communications employing conventional CDMA are also problematic because it is difficult to realize a seamless indoor/outdoor communication environment due to synchronization between base stations, and to realize high-accuracy control of the electrical power for transmission.

[0005] Additionally, in a mobile telephone, reduction of power consumption is a crucial issue, since a chargeable battery is used as the power supply.

DISCLOSURE OF THE INVENTION

[0006] It is therefore an object of the present invention to provide a wide band CDMA communication method that can solve the above-mentioned problems to set a frequency band to be used to width band basically. Furthermore, it is an object of the present invention to provide the reduction of the power consumption, the improving of the communication quality, and the utilization efficiency of the frequency resources. The present invention provides a wide band CDMA communication method which transmits spread information after spreading transmission information using predetermined codes; wherein when the transmission information different from one another are transmitted at the same time through a plurality of channels using common control information, the wide band CDMA communication method comprises the steps of: spreading various transmission information using codes, the codes being allocated to the channels, respectively; transmitting the spread transmission information through the channels; spreading the control information using a common code, the common code being common to the plurality of channels; and transmitting the spread control information. By virtue of the above invention, it is possible to improve the efficiency in use of the frequency resources, because the same control information which is transmitted individually using a plurality of codes in conventional method, is transmitted by one code. Furthermore, it is possible to improve the receiving accuracy, that is, the communication quality, avoiding the unevenness of the receiving power level in the receiving side, if the control information is transmitted by one channel, and if the transmission power of the control information is the transmission power of the transmitted information multiplied by the number of the channels through which the spread transmission information are transmitted.

[0007] The present invention provides a wide band CDMA communication method which transmits spread information to a radio section after spreading the transmission information using a predetermined code; wherein the wide band CDMA communication method comprises the step of determining to transmit or to discard the transmission information on the basis of the communication quality of the radio section. By virtue of the above invention, a practical effective transmission speed of the transmission information is adjusted in accordance with the communication quality in the radio section, and information is transmitted efficiently. Therefore, it is possible to improve the efficiency in use of the frequency resources and the reduction of the power consumption.

[0008] Furthermore, the present invention provides a wide band CDMA communication method which transmits spread information to a radio section after spreading the transmission information using a predetermined code; wherein the wide band CDMA communication method comprises the step of: determining to transmit or to discard the transmission information on the basis of the communication status of the radio section. By virtue of the above invention,

it is possible to prevent recalling for retransmitting the transmission information that the calling has been failed, and to improve the efficiency in use of the frequency resources and the reduction of the power consumption, if the transmission information to be transmitted is discarded, when the calling has been failed, for example.

[0009] Furthermore, the present invention provides a wide band CDMA communication method which transmits spreaded information to a radio section after spreading transmission information using a predetermined code; wherein the wide band CDMA communication method comprises the steps of: discarding the transmission information until a predetermined time passes after a call is released. By virtue of the above invention, it is possible to restrain the frequent calling result from the transmission information which occurs sporadically, and to improve the efficiency in use of the frequency resources and the reduction of the power consumption.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. 1 is a block diagram showing a system overview of a preferred embodiment in this invention.
 Fig. 2 is a block diagram showing the constitution of a mobile station MS in the same preferred embodiment.
 Fig. 3 is a block diagram showing the constitution of a transmitting/receiving amplifier AMP and a radio unit TRX.
 Fig. 4 is a block diagram showing the constitution of a base band-signal processing unit BB.
 Fig. 5 is a block diagram showing the constitution of a terminal interface unit TERM-INT.
 Fig. 6 is a diagram showing the constitution of a logical channel of the same preferred embodiment.
 Fig. 7 is a diagram showing the constitution of a physical channel of the same preferred embodiment.
 Fig. 8 is a conceptual diagram showing a signal format which is other than that for an uplink common control physical channel.
 Fig. 9 is a conceptual diagram showing a signal format for an uplink common control physical channel.
 Fig. 10 is a conceptual diagram showing the relationship between the physical channel and the logical channel to be mapped.
 Fig. 11 is a conceptual diagram showing an example of a logical channel mapping onto a perch channel.
 Fig. 12 is a conceptual diagram showing a mapping method for PCH.
 Fig. 13 is a conceptual diagram showing a mapping method for FACH.
 Fig. 14 is a conceptual diagram showing a method for mapping DTCH and ACCH onto an dedicated physical channel.
 Fig. 15 is a conceptual diagram showing a method for mapping ACCH to the super frame of a dedicated physical channel at each symbol rate.
 Fig. 16 is a conceptual diagram showing a coding method for BCCH1, BCCH2 (16 ksps).
 Fig. 17 is a conceptual diagram showing a coding method for PCH (64 ksps).
 Fig. 18 is a conceptual diagram showing a coding method for FACH-L (64 ksps).
 Fig. 19 is a conceptual diagram showing a coding method for FACH-S (64 ksps) in normal mode.
 Fig. 20 is a conceptual diagram showing a coding method for FACH-S (64 ksps) in ACK mode.
 Fig. 21 is a conceptual diagram showing a coding method for RACH-L (64 ksps).
 Fig. 22 is a conceptual diagram showing a coding method for RACH-S (64 ksps).
 Fig. 23 is a conceptual diagram showing a coding method for SDCCH (32 ksps).
 Fig. 24 is a conceptual diagram showing a coding method for ACCH (32/64 ksps).
 Fig. 25 is a conceptual diagram showing a coding method for ACCH (128 ksps).
 Fig. 26 is a conceptual diagram showing a coding method for ACCH (256 ksps).
 Fig. 27 is a conceptual diagram showing a coding method for DTCH (32 ksps).
 Fig. 28 is a conceptual diagram showing a coding method for DTCH (64 ksps).
 Fig. 29 is a conceptual diagram showing a coding method for DTCH (128 ksps).
 Fig. 30 is a conceptual diagram showing a coding method for DTCH (256ksps).
 Fig. 31 is a conceptual diagram showing a coding method for DTCH (512 ksps).
 Fig. 32 is a conceptual diagram showing a coding method for TCH (1024 ksps).
 Fig. 33 is a conceptual diagram showing a coding method for UPCH (32 ksps).
 Fig. 34 is a conceptual diagram showing a coding method for UPCH (64 ksps).
 Fig. 35 is a conceptual diagram showing a coding method for UPCH (128 ksps).
 Fig. 36 is a conceptual diagram showing a coding method for UPCH (256 ksps).
 Fig. 37 is a conceptual diagram showing a usage method for a W-bit bit pattern.
 Fig. 38 is a block diagram showing the constitution of a convolutional coding device.
 Fig. 39 is a conceptual diagram showing the correspondence between SFN and sfn which is to be transmitted.
 Fig. 40 is a timing chart showing the transmission timing and the long code phase in the perch channel and the